National Aeronautics and Space Administration

KSC NEWS tech transfer

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CORROSION TECHNOLOGY LABORATORY

Dr. Luz Calle and her colleagues are helping NASA battle one of the most corrosive environments in the world. See pages 4–5 to learn about their cutting-edge technologies and how Kennedy's Innovative Partnerships Program Office is supporting them.

in this issue:

photo credit: Tom Farrar, NASA's Kennedy Space Center

Meet the Staff:
Jim Nichols, Out-Licensing Kennedy's Technologies

photo credit: Tom Farrar, NASA's Kennedy Space Center

Jim Nichols

As licensing manager in the Innovative Partnerships Program (IPP) Office at NASA's Kennedy Space Center, Jim Nichols plays a key role in promoting Kennedy-developed technologies. He is quick to share the credit for commercial success stories, such as those featured on pages 6–7.

"It is a team effort that starts with an innovator creating an exciting new technology and submitting a New Technology Report (NTR) [on it] to our office," Nichols says. "The licensing team reviews NTR submissions in an effort to identify candidates with commercial potential, and then they market the technology to find a fit with the right company. We also work closely with patent counsel to secure ownership of the intellectual property and negotiate a licensing agreement."

Kennedy's licensing office looks for technology that has made it to the prototype stage and has proven potential. Nichols and his colleagues work to identify specific problems that a technology may address, how the technology differs from commercially available solutions, and what makes the technology unique.

Innovators play an important role in helping to identify commercial potential for their technologies, which often requires creative thinking.

"We are sometimes so focused on one mission here, so we need to try to investigate how a technology that has been designed for space application or to solve a launch pad problem can be used for something completely different," Nichols explains. "Innovators are very creative to come up with new technologies, so we tap into that creativity when we are identifying commercial uses for their innovations."

Another challenge in developing a successful commercial product is that the technology often needs additional design and testing before it is ready to sell. Finding a company that has the resources and capacity to develop the technology is important for commercial success. Innovators can help the company by serving as a resource. The licensing office tracks sales and markets success stories.

One such licensing success story is Emulsified Zero-Valent Iron (EZVI), a biodegradable environmental cleanup technology that uses iron particles in an environmentally friendly oil and water base to neutralize toxic chemicals. Developed by Kennedy's Dr. Jacqueline Quinn and Kathleen Brooks Loftin and three University of Central Florida professors, EZVI has generated eight licenses, leading to numerous commercial applications that are restoring the health of our environment.

Everyone benefits from the licensing successes forged by Nichols and his team. Innovators become eligible for awards and get to see their inventions evolve and solve important problems, commercial partners grow their businesses, and NASA contributes to bettering the environment and in other ways that improve the lives of people everywhere.

"The IPP Office recognized that the laser scaling device we developed to identify small defects on the shuttle's external tanks could be used in crime scene investigations. Now the military is using it to solve violent crimes in Iraq. It is a great feeling to see your technology have so many positive impacts."

— Dr. Robert C. Youngquist, Lead, Kennedy's Applied Physics Lab

"Thanks to the work of the IPP Office, several companies expressed an interest in licensing our standing wave reflectometer, and now Eclypse International has manufactured hundreds of the devices. Commercial airliners are using them, and the military is using them to repair helicopters and airplanes and cabling in tanks, and that makes me very proud."

— Dr. Pedro J. Medelius, Deputy Program Manager, Chief Scientist, ASRC Aerospace Corporation

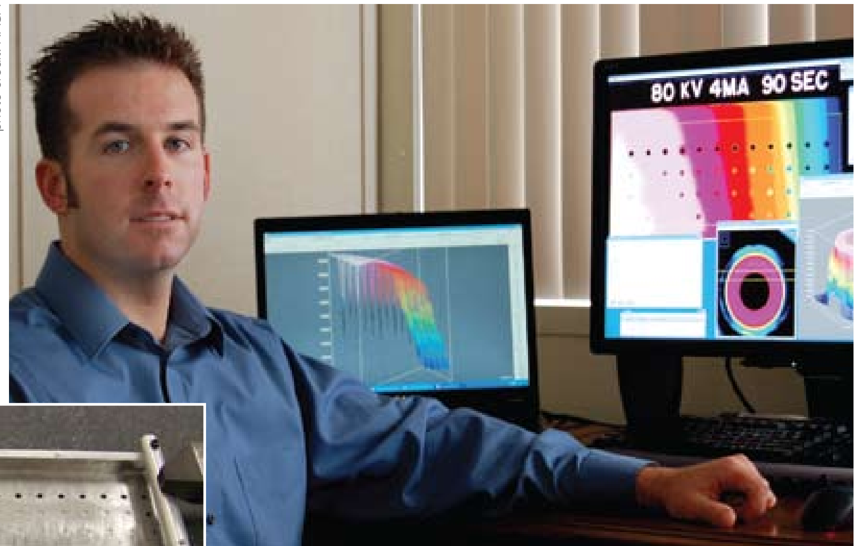
NTR Corner: David Grau

Technology title: **Optical Density Analysis of X-rays Utilizing Calibration Tooling to Estimate Thickness of Materials**

Inventor: **David Grau**

Case #:**KSC-13206**

photo credit: NASA



David Grau's technology has been tested and verified using a machined wedge (inset). The larger computer monitor (right) shows the radiographic image of the wedge, while the smaller monitor (behind Grau) displays a three-dimensional representation of the wedge's dimensional properties.

What it is: This innovation expands the capability of a widely used nondestructive inspection technique, enabling the extraction of an estimated measurement of a change in thickness in homogeneous objects, such as flight hardware support equipment and flight hardware itself. The technique quantitatively determines changes in an object's thickness by measuring variations in radiographic image density.

What makes it better: This technology represents a significant breakthrough because previous methods for estimating thickness or change in thickness of materials using nondestructive evaluation required tedious, hands-on testing. This technology can be used to assess large areas of an object in a short amount of time. It also can be used in cases where access is limited or impossible. Even X-ray images taken years before an analysis is needed can be used to estimate a part's current thickness, which can ultimately be used to determine an object's strength. Prior to the development of this and concurrent technology, X-rays only could be used to provide qualitative assessments of thickness.

This technology won an Exceptional Space Act Award from NASA's Inventions and Contributions Board (ICB). See page 12 for a list of ICB award winners.

How it might be used: This technique, in concert with a typical engineering analysis, can be used in a wide range of nondestructive testing applications to quantitatively determine a variety of an object's characteristics (e.g., strength and size). It has been approved by NASA engineering review boards for use on flight hardware procured by NASA's Launch Services Program. NASA used it successfully in the recent evaluation of manufacturing defects in Delta II second stage propellant tanks. Evaluation of tank defects using only previously available testing methods may have required several thousand combined labor-hours. However, by using this new technique, the same type of analysis took less than 100 hours, conducted by a single person. With proper development of tooling and processing, application of this technique would be easy for a number of manufacturing environments in the industrial community.

Tech transfer status: The technology is being evaluated for patenting and licensing. ■

Register now for July 13th training session

Introduction to NASA Technology Transfer

July 13th • 9 a.m. to 11:30 a.m. or 1:30 p.m. to 4 p.m. – *Choose the session time that works best for you!*

Technology transfer benefits you as well as NASA. This overview course teaches civil servants and contractors the ins and outs of technology transfer, including Kennedy-specific practices. You will learn how to work with Kennedy's Innovative Partnerships Program Office, understand the various mechanisms used to partner with organizations, and identify factors that accelerate the transfer of technology to new non-NASA applications.

Offered in the KSC Learning Institute M6-570, located south of the HQ building. Choose the morning or afternoon session. For details, please call Carol Dunn at 867-6384. You must register in SATERN to attend. To register, visit **https://satern.nasa.gov**. Registration is on a first-come, first-served basis. ■

Corrosion Technolo

The nation's premier spaceport, NASA's Kennedy Space Center is located in one of the most corrosive environments in the world. This creates a unique need and opportunity for lead scientist Dr. Luz Marina Calle and her team at Kennedy's Corrosion Technology Laboratory.

What does the Corrosion Technology Laboratory do?

Research and development of technologies that offer corrosion protection or prevention at the launch facilities is a high priority for NASA. Our primary objective is to support the NASA mission of launching safely, despite a very corrosive environment. The corrosion lab also supports ground operations at Kennedy. Scientists and engineers at the lab are working continually to reduce the impact of corrosion and develop new corrosion prevention technologies.

Our facilities for corrosion research and testing include a beachside atmospheric exposure site with a full-weather data station and seawater immersion tanks, an electrochemistry and coating development laboratory, special equipment for accelerated corrosion testing, a coatings application facility, and a photo documentation lab. NASA began corrosion studies at Kennedy in 1966, during the Gemini/Apollo Programs, and has actively maintained the site for more than 40 years, performing evaluations of new materials and generating a historical database.

photo credit: George Shelton, NASA's Kennedy Space Center

Dr. Wendy Li and Dr. Luz Marina Calle examine the microcapsules that form the core of the innovative smart coatings technology (see inset).

Why is corrosion protection so important?

The American Society of Materials has documented the environment near the launch pads at Kennedy as one of the most naturally corrosive in the world, attributable to salt from ocean spray. With the addition of the space shuttle in 1981, the already highly corrosive conditions increased from the acidic exhaust generated by the shuttle's solid rocket boosters. This environment is unique in the aerospace industry. We have to deal with issues that nobody else in the world has to address.

How is your laboratory supporting the Constellation Program?

Our lab is responsible for evaluating and developing different coatings and corrosion-resistant alloys to protect flight hardware, launch pad structures, and ground support equipment for the Constellation Program.

Each of Kennedy's two shuttle launch sites consists of 68,000 cubic yards of concrete, weighing 1.3 million pounds. As reconstruc-

photo credit: Hal Harmon, NASA's Kennedy Space Center

gy Laboratory

tion of these two launch pads takes place to accommodate the manned Ares I (crew launch vehicle) and the unmanned Ares V (cargo launch vehicle), the lab is developing technology to protect these structures. Recently, a sacrificial galvanic coating was developed to prevent the corrosion of steel rebar in concrete. This has proven to be a great innovation. In fact, the Innovative Partnerships Program (IPP) Office at Kennedy licensed out the patented technology to two companies who now are reformulating and testing the coating on structures throughout the world.

Our lab also is developing multi-functional coatings or "smart coatings" to detect and control corrosion in carbon steel that will be prevalent in the new launch pad structures and support equipment. Smart coatings, which can sense the environment and provide an appropriate response to corrosion, represent state-of-the-art coating technology. In fact, we have received six Space Act Awards from NASA for our smart coating technologies. *(Editor's note: See page 12 for more about NASA awards.)*

photo credit: NASA

Kennedy's state-of-the-art facilities to study and develop new corrosion-inhibiting technologies include a beachside atmospheric exposure test site (see the cover), booths to apply innovative paints, and much more.

It sounds like smart coatings hold great promise. Can you tell us a little bit more about their origins?

At the outset, we were thinking about how to better utilize microcapsules in a smart coating that could sense the presence of corrosion and provide the appropriate response without human intervention. At that time, the research on smart coatings was very new. We focused on the pH in corrosion and made a connection to pharmacology. Like pills that release their contents when exposed to stomach acid, we designed microcapsules for smart coatings to release their contents in response to certain pH levels caused by corrosion.

In the past, microcapsules were used in coatings, but the contents in these capsules could only be released mechanically, such as in response to a scratch or abrasion. The groundbreaking advantages of our smart coatings are that they not only provide barriers to the environment but also offer the controlled release of a corrosion inhibitor, as demanded by the presence of corrosion or mechanical damage. The smart coating technology is environmentally friendly because the corrosion inhibitors activate only when and where necessary.

How will NASA use your smart coatings?

Our lab is collaborating with PPG Industries and the University of Texas Health Science Center, with support from the IPP Partnership Seed Fund, to develop a paint formulation that incorporates microcapsules. Our goal is to incorporate the microcapsules into the paint intended for the launch pads. We do not have a can of paint yet, but we are obtaining useful information and getting closer. We need to accomplish this goal by 2015, and I am optimistic that we can achieve it.

How has collaboration helped the project?

The microcapsules need to be effective in paint to have a practical use for NASA missions, and PPG has ample paint formulation experience. Thanks to the IPP Seed Fund, we were able to form this partnership to formulate the microcapsule technology for smart coatings. *(Editor's note: Another IPP Seed Fund project is featured on page 8.)*

Collaborations are very important, and the IPP Office has been a big help with that. They also have helped us market our lab and technologies through articles in magazines and on Web sites as well as by creating promotional posters and other materials for conferences. We consider the IPP Office to be a true partner. ■

Calibrating a Calibration Tool

NASA invention solves innovators' problem and manufacturer's too

Photo courtesy of Setra Systems

What does an innovator do when existing methods of calibrating a critical environment pressure sensor are cumbersome and produce shoddy results? Richard Deyoe and Stephen Stout, ASRC Aerospace meteorologists based at NASA's Kennedy Space Center, decided to design and build their own calibration unit. Now, Setra Systems—the company whose pressure sensor Deyoe and Stout were trying to calibrate—is using their invention to improve its own product line.

Creating a Technology Solution

In the early 1990s, Deyoe and Stout wanted an accurate, cost-effective technique to perform onsite qualification testing of Setra Systems' Model C264 low-differential pressure transducer. The basic problem was that Setra's new pressure transducer technology and accuracy had exceeded the accuracy of commercially available calibration equipment. A portable, lower cost calibrator was needed that could control the differential pressure to a high degree of resolution without having to be in an environmentally controlled room.

"There was no method and no equipment for qualifying the Setra C264," Deyoe recalls. "Even the reading of the standards was a problem because the lowest standard we had was a one-pounder. We had a job to do and we needed to find a way to get it done, so we created our own device."

Photos courtesy of Setra Systems

The researchers decided that to generate the low-differential pressure set points needed for qualification testing, very small gas volume changes could be made against the test article, and a corresponding pressure change would be detected by a pressure standard. The resulting pressure generator offered control, sensitivity, accuracy, and repeatability that exceeded anything commercially available, then or now.

In 1993, Deyoe and Stout developed a prototype of the pressure generator, and by 1995, they had perfected the prototype unit still used today, known as the Low Differential Pressure Generator. NASA saw the merit of the invention and patented it in 1997 (U.S. Patent No. 5,693,871).

Meanwhile, over at Setra Systems…

Ironically, Setra Systems struggled with the same issues as Deyoe and Stout and began searching for a technology for certification testing of its C264. When looking for a possible solution, the company learned of Kennedy's patented Low Differential Pressure Generator.

"We had already started down the path of solving the problem, and we noticed that NASA had solved it in a different way," said Terry Troyer, HVAC Product Marketing Manager at Setra. "When we saw the NASA patent, we thought it would be very advantageous to add this to our IP portfolio. We were happy to tap into it."

Setra Systems licensed Deyoe and Stout's technology in March 2005, and then the company advanced it further. Using a product development team of 14 engineers and investing more than $200,000, the company added a computerized micro-control to the NASA generator. They also added Setra's patented on-board standard transducers, battery power, and a nifty pocket PC user interface to complete the calibration package.

Setra Systems now markets the upgraded device, renamed the Micro-Cal 869, worldwide and has sales in excess of $1 million. Users include the pharmaceutical industry, required by the Federal Drug Administration to certify the accuracy of its air-handling sensors. Other opportunities abound for this device, for calibrating pressure transducers used in cleanrooms, hospital isolation rooms, laboratory fume hoods, and nuclear and aerospace laboratories.

"The portable, multi-function Micro-Cal Model 869 calibrator replaces cumbersome, inaccurate components previously used for in-situ, field calibrations—usually a hand pump, a pressure indicator, and data logger," Troyer said. "During on-site product demonstrations, we literally observe 'eye-popping' responses from calibration technicians when they see the speed, accuracy, repeatability, and convenience of the 869."

"It is a good feeling to see the device we invented being used by Setra in the private sector," Deyoe said. "The technology transfer process was a group effort, and the IPP Office was a big help with finding a partner and getting the technology out there. I am very proud of what has occurred." ■

Infusion Effort Nets Current-to-Voltage Converter to Benefit Space Shuttle Program

The Transducer Development Lab at NASA's Kennedy Space Center and its engineering support contractor, ASRC Aerospace, Inc. have successfully developed a current-to-voltage signal converter that meets Space Shuttle Program requirements for conversion on a field-mounted hydrogen gas detector sensor/transducer. With infusion support from Kennedy's Innovative Partnerships Program (IPP) Office, commercial companies have delivered multiple devices that use the advanced current-to-voltage signal converter/conditioner to NASA.

Responding to a Specific Technology Need

NASA's Space Shuttle Program had a specific need for a voltage signal output from the hydrogen gas detectors for its launch processing system. However, industry standards for this type of instrumentation are typically DC current output (rather than voltage output). So the Space Shuttle Program asked the Transducer Development Lab to deliver a signal converter. In addition, the converter needed to meet other shuttle requirements, such as component input/output isolation, performance over an extended operating temperature range, and electromagnetic compatibility (EMC) levels. A market survey revealed that no available devices met the EMC or isolation requirements, so Kennedy's Transducer Development and Electronics Labs began working with ASRC Aerospace to develop a suitable converter.

photo credit: Tom Farrar, NASA's Kennedy Space Center

This current-to-voltage signal converter meets Space Shuttle Program requirements.

One Design Leads to Another

Development efforts led the Transducer Development Lab to discover that the transmitter modules used with hydrogen gas (H_2) gas sensors made by Detector Electronics Corporation (Det-Tronics®) for protection of a gas leak in the shuttle staging area had been phased out, and existing signal conditioners had reached obsolescence. Because the transmitter circuitry used along with the H_2 sensors contained older current-to-voltage circuit boards designed by NASA, the development team expanded its effort to design a product that would work for both the field-mounted transducer and the H_2 gas detector transmitter, answering two Space Shuttle Program needs with one device. Other minor design changes accommodated the need for signal conditioning, effectively making the board a backplane that NASA now employs in the shuttle's new platinum resistance temperature detector sensor signal conditioners, silicon diode sensor temperature conditioners, and the frequency-to-voltage signal conditioners which are used with existing turbine flowmeters.

The enhanced current-to-voltage board was further improved by providing EMC for the board itself as well as any device connected to it. The result: any commercial off-the-shelf device connected to the enhanced current-to-voltage board could meet 79K ground support equipment (GSE) electrical qualification design requirements.

Ongoing Infusion Success Nets a Win-Win-Win

The enhanced current-to-voltage board design was of interest to Det-Tronics, so the IPP Office established a Technology Transfer Agreement, granting the company access to the complete build drawing package. Since then, Det-Tronics has delivered gas detection devices that, thanks to the board, meet all GSE requirements at Kennedy. In addition, ASRC Aerospace has delivered dozens of devices that utilize the technology.

Through this successful relationship with the Transducer Development and Electronics Labs and the Space Shuttle Program, and with support from Kennedy's IPP Office, ASRC Aerospace, Det-Tronics, and NASA are reaping the benefits of this infusion success. ■

Det-Tronics is a registered trademark of Detector Electronics Corporation.

IPP Seed Fund Enables Lunar Analog Field Testing of ISRU and HRS Systems

photo credit: NASA

The lunar analog site at the University of Hawai'i-Hilo proved to be an excellent environment for testing innovative exploration technologies. The IPP Seed Fund helped make the November 2008 testing possible.

A 2007 IPP Partnership Seed Fund award to NASA's Kennedy Space Center enabled researchers to conduct lunar analog tests of In Situ Resource Utilization (ISRU) and Human Robotics Systems (HRS) technologies and methods.

Conducted in November 2008 on the Big Island of Hawai'i, a volcanic island where the terrain and soil closely resemble that of the Moon, this collaboration involved the ISRU and HRS project teams at Kennedy, Johnson Space Center (with expertise from Glenn Research Center), and the Pacific International Space Center for Exploration Systems (PISCES) at the University of Hawai'i–Hilo.

Returning to the Moon

Cost and risk factors preclude transporting all the necessary oxygen, water, food, and other resources from Earth for long-term or permanent live/work outposts on the moon. Therefore, ISRU systems—resource prospecting and capabilities such as lunar outpost site preparation and protection, oxygen production from regolith (or soil), and in-situ water production using HRS mobility platforms—will be essential.

ISRU has been written about conceptually for more than 40 years. But demonstrations of ISRU technologies were restricted to laboratory tests. The recent field demonstrations enabled by the Seed Fund helped researchers understand how the robotics systems behave outside of the lab. "The IPP Office was integral to us being able to get to the field," said Dr. Jackie Quinn, an environmental engineer and project manager of the Regolith and Environment Science and Oxygen and Lunar Volatile Extraction (RESOLVE) system, one of the innovations field tested. "Without their advocacy and instrumental role in helping us to acquire these augmenting funds, our success in the field certainly would not have come to fruition."

A Fertile Testing Ground

Seed Fund support enabled testing of ISRU and HRS technologies in an analog lunar environment. The PISCES site, located on the lower slopes of Mauna Kea, a 13,700-foot dormant volcano, was ideal because of its abrasive soil, having a mineral composition similar to lunar regolith as well as subsurface permafrost for testing lunar water prospecting systems.

One of the technologies tested was the RESOLVE system for extracting usable oxygen from volcanic rock. For the first time ever, researchers validated RESOLVE's use, proving to the world that oxygen can be derived from materials already located on the moon. Researchers also field tested the surface capabilities of an ISRU excavator (blade/scoop) and an HRS surface mobility platform (prospecting rover). The demonstrations validated surface system capabilities under simulated mission conditions, helping researchers understand how these technologies may function (or fail to function) on the Moon. "You always learn things when you move out into nature that you don't learn in a controlled environment like a lab because nature always throws you a curve," said Bill Larson, chief of the Applied Science Division and Space Resource Utilization program manager at Kennedy. "We were met with all kinds of challenges, but we were able to achieve all the test objectives we set out for ourselves."

Promoting Economic Development

In addition to NASA's technological benefits, this collaborative agreement also has contributed to Hawaiian economic development. The creation of PISCES and its lunar analog test site, spurred by NASA and the research conducted thus far, is expected to encourage many space exploration organizations to make significant research agreements with PISCES, generating continued employment opportunities in the field of space exploration. This will enhance the state's economy and job market. "Education and public outreach are central to the mission of PISCES," said Dr. Frank Schowengerdt, director of PISCES.

(continued on page 9)

Q&A Intellectual Property Protection in Collaborations

Insights from Kennedy's Patent Counsel Randy Heald

Intellectual property (IP) protection is when a patent or copyright is obtained to maintain NASA's rights in the inventions, designs, techniques, tools, devices, software, or other innovations created at NASA's expense and/or interest. How well do you understand how to protect your innovations?

1. ***I reported my technology through NASA's Electronic New Technology Reporting system (http://entre.nasa.gov), so my technology is safe, right?***

   Not necessarily. Technologies are first evaluated to determine whether IP protection measures are appropriate. If you disclose your technology (e.g., present it at a conference) before NASA initiates patent/copyright efforts, the IP protection may be lost. This has negative financial impacts for you and for NASA.

2. ***Is IP automatically protected when civil servants and/or NASA support contractors collaborate with third parties?***

   Not necessarily. The proper agreement(s) must be in place—such as a Space Act Agreement or a nondisclosure agreement (NDA)—before such collaborations occur. Such agreements protect both existing IP and the IP that may result from your collaborative research.

3. ***Is IP protection automatic when I collaborate with other federal laboratories?***

   Not necessarily. Steps to protect the IP need to be taken to minimize the risk of loss of IP rights. To minimize the risk and in accordance with NPR 1600.1-5.24.2.1(b)(2), put a "Sensitive But Unclassified" (SBU) notice in the header/footer of the documentation disclosing an innovation/invention. If you share your innovation with non-NASA federal entities (e.g., the U.S. Air Force), be sure to include the SBU Cover Sheet explaining what SBU means (i.e., that the recipient is obligated to protect the information).

   The exception is software, which requires SBU protection as well as additional IP protection. To properly protect software when provided to any party other than a Kennedy Space Center employee/contractor, a Software Usage Agreement (SUA) must be in place before the software source code is shared outside Kennedy, even with another NASA center.

4. ***What happens if I make a mistake and share my innovation or software when I have not taken steps to protect NASA's IP rights?***

   If an enabling description of a NASA invention is put into the public domain "without restriction"—be it published in a journal, posted on a Web site, e-mailed to someone, discussed by phone, etc.—then NASA loses its foreign patent rights and can lose its ability to patent and license the invention in the United States. If you have questions about when and how you should disseminate NASA's innovations—or what to do if you have already disseminated information—contact Kennedy's Patent Counsel (867-7214; Randall.M.Heald@nasa.gov) immediately so that he can determine the best course of action.

5. ***So, what do I do if I want to collaborate with an outside researcher or organization?***

   If you want to establish a collaboration or if you are already working with an external partner—be it a company, university, not-for-profit organization, another government agency, or even another NASA center—first contact the IPP Office and let us help you protect NASA's IP rights arising from your hard work:

   - 867-6384; Jim.Nichols@nasa.gov
   - 861-7158; Jeffrey.A.Kohler@nasa.gov ■

IPP Seed Fund *(continued from page 8)*

"NASA does a great job of spreading the word to the public," added Dr. Robert Fox, deputy director of PISCES. "They went into every corner of the public to promote the science and make sure people understood the value of what they were doing with us." Schowengerdt and Fox noted that the educational outreach combined with the increased exposure of PISCES to space-faring countries on the Pacific Rim have the potential to improve educational and economic opportunities for the State of Hawai'i.

Collaboration Continues, Internationally

These field demonstrations also involved collaborations with the Canadian Space Agency (CSA) via a separate agreement with NASA Headquarters and an agreement between the German Aerospace Center (*Deutsches Zentrum für Luftund Raumfahrt,*

(continued on page 12)

The Federal Laboratory Consortium for Technology Transfer: A Unique Benefit to the U.S. Economy

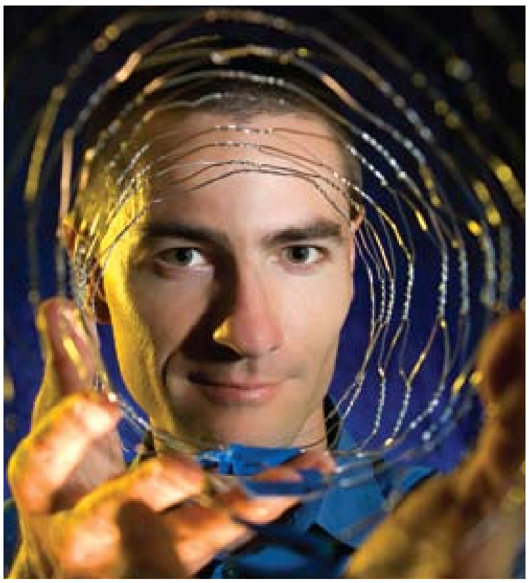
By Carol Anne Dunn

Photo courtesy of FLC

Exhibitors discuss their latest technologies during the 2008 FLC Awards poster session in Portland, Oregon.

The Federal Laboratory Consortium for Technology Transfer (FLC) was created because of the persistence and work of a few very dedicated individuals, notably George Lindsteadt, who had the vision and foresight to realize that government labs were ideally placed—and in fact the biggest contributor—to the research and development (R&D) efforts of the nation. R&D was negligible before World War II; however, the war necessitated coordination of huge resources and needs with the untapped capabilities of federal government laboratories. After World War II, it became clear that the mission-driven interdisciplinary work of the government laboratories provided technologies that private industry was not developing. Congress quickly realized that federal laboratories could solve a myriad of national problems. The FLC was formally organized in 1974 and chartered in 1986 by the Federal Technology Transfer Act.

photo credit: Randy Wong for Sandia National Laboratory



The FLC promotes the work of federal researchers such as François Léonard of Sandia National Laboratory, who studies the physics of carbon nanotubes, which he compares to chicken wire when lecturing to students.

In harmony with its founding legislation and related federal policy, the FLC mission is to promote and facilitate the rapid movement of federal laboratory research results and technologies into the U.S. economy mainstream. The FLC also provides professional development and training opportunities for technology transfer personnel in the laboratories.

Today, the FLC is a nationwide network of more than 250 federal laboratories and provides a forum to link mission technologies with expertise in the marketplace. These labs and their parent departments and agencies conduct $100 billion in R&D annually and employ over 100,000 scientists and engineers. Much of this investment is leveraged by transferring technology to U.S. industry, which strengthens the U.S. industrial base and creates many new jobs and businesses. Other results include cleaner air, improved consumer products, increased public safety, and more accurate medical tests. Not only does the FLC provide benefits to its member laboratories, but it also provides expertise to academia and industry.

NASA is unique among government agencies because it had a formalized technology transfer program established upon its creation in 1958. NASA was the first major government agency mandated to establish an agency-wide program to promote transfer of its technology outside of its technological capabilities and expertise.

NASA's Kennedy Space Center is a member of the FLC Southeast Region, which encompasses the technology transfer offices of more than 40 federal laboratories in Alabama, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, and Tennessee. David Makufka, Chief of the Technology Programs and Partnerships Branch, is Kennedy's representative to the FLC and actively participates in its regional and national meetings.

The vision of the FLC is to actively promote the fullest application and use of federal research and development by providing an environment for successful technology transfer. Often the FLC will facilitate resources that can be leveraged between industry, academia, and government labs, resulting in shared expertise and lower costs. The FLC is a unique resource for technology transfer. If you would like to learn more, visit FLC's Web site at http://www.federallabs.org.

Information supplied by the Federal Laboratory Consortium. The author would like to thank Dr. Cristy S. Johnsrud, FLC Southeast Region Support Office, and Tom Grayson, FLC Management Support Office, for supplying research material and assisting with this article. ■

Space Act Awards Luncheon: A Great Success

By Carol Anne Dunn

Steven Stout (center) and Richard Deyoe (right) discuss their licensing success (see page 6) with Dr. Ravi Margasahayam.

David Makufka is chief of Kennedy's IPP Office, which hosted the luncheon.

Terry Troyer of Setra Systems receives a thank you gift from Carol Dunn of Kennedy's IPP Office for speaking about the company's successful licensing of Kennedy technology (see page 6).

Dr. David E. Bartine, director of Kennedy's Applied Technology Directorate, and patent award–winning inventor Dr. Clyde Parrish.

More than 145 people attended this year's luncheon.

photo credit: Tom Farrar, NASA's Kennedy Space Center

This year's Space Act Awards Luncheon was held at the Cocoa Beach Courtyard by Marriott on January 29, 2009. The luncheon, sponsored by Kennedy's Innovative Partnerships Program (IPP) Office, marked its tenth anniversary this year with this well-organized and well-attended event.

Held every year to honor those who have earned a Space Act Award from NASA's Inventions and Contributions Board (ICB) during the previous year, the luncheon recognizes the outstanding work of Kennedy's engineers, technicians, and scientists for innovative solutions to mission problems. The presenters gave awards for the release of software programs, the filing of patent applications, and the publication of articles in NASA Tech Briefs, as well as the esteemed Board Action Awards. More than 145 people attended this year's luncheon and enjoyed a mouth-watering buffet of pork, pasta, and chicken as well as a wide variety of sumptuous deserts. The theme of the luncheon was "Innovation" and the tabletop decorations echoed this theme with photos and descriptions of a variety of NASA spinoffs.

The various NASA managers in attendance included:

- **Robert D. Cabana**, Director, Kennedy Space Center, who gave a welcoming address and handed out patent awards
- **Dr. David Bartine**, Director, Kennedy's Applied Technology Directorate
- **Douglas Comstock**, Director, Innovative Partnerships Program, NASA Headquarters
- **Tony Maturo**, Staff Director, ICB, NASA Headquarters
- **David R. Makufka**, Chief, Kennedy's IPP Office

Other noted guests included managers from United Space Alliance (USA), the Boeing Company, and ASRC Aerospace Corporation.

The guest speaker was Terrence Troyer, HVAC Product Manager for Setra Systems, Inc., which licensed Kennedy's Low Differential Pressure Generator in March 2005. Terry's informative presentation recounted this licensing success story. The innovators of the original NASA technology, Richard Deyoe and Stephen Stout, also attended the luncheon. (For more information on this licensing success story, see the article on page 6.)

Both NASA's ICB and Kennedy's IPP Office gave a special award this year to 2008 retiree Art Beller for his work with the Software of the Year panel. Art represented Kennedy on the panel for 6 years and was instrumental in assisting Carol Dunn, Kennedy's Awards Liaison Officer, in preparing candidates for the competition. ■

Inventions and Contributions Board Awards

October 1, 2008 to March 30, 2009

To be eligible for any of these awards, innovations must have a New Technology Report (NTR) on file. For the Space Act Board Award, NASA Form 1329 also must be completed. Kennedy's IPP Office can help with the award application process. For more information, contact Kennedy's Awards Liaison Officer: Carol Dunn (867-6381; carol.a.dunn@nasa.gov).

Board Action Awards

For technologies with significant scientific and technical contributions
Value: Up to $100,000

Dust Particle Analyzer Image Acquisition Code by Ellen Arens†

Electrostatic Monitoring System by Yongming Zhang

Encapsulation of a Corrosion Inhibitor in a Capsule Made from Water-Soluble Prepolymer and Cross Linker by Samuel Jones, Wenyan Li, Paul Hintze†, Scott Jolley, and Luz Calle†

Ice Adhesion Reduction Coating for Use as a Shuttle Ice Liberation Coating (SILC) by Michael Prince†, Charles DeWeese†, Leslie Curtis†, Erik Weiser†, Roberto Cano†, and Trent Smith†

Inert Welding/Brazing Gas Filters and Dryers by Jerry Goudy

New Process for Measuring Over-Center Distances by Joddy Stahl, Douglas Willard†, Kevin Murtland†, Steven Parks†, and Robert Youngquist†

Optical Density Analysis of X-rays Utilizing Calibration Tooling to Estimate Thicknesses of Parts by David Grau†

Portable Hand-held Optical Window Inspection Device by Curtis Ihlefeld†, Bradley Burns, and Adam Dokos†

Spacecraft Maintenance Automated Repair Tasks (SMART) by Joseph Schuh†, Brent Mitchell, Louis Locklear, Martin Belson, Mary Jo Al-Shihabi, Elkin Norena, Derek Hardin, and Nadean King

Patent Application Awards

For the filing of a full patent application
Value: $1,000 (or $500 per inventor)

Device Data Transmission by Marlin Mickle, James Cain, David Sammel, and Minhong Mi

Human Factors Process Failure Modes and Effects Analysis (HF PFMEA) Software Tool by Faith Chandler†, Bill Valentino, Monica Philippart, Colette Bessette, Nathanael Shedd, and Kristine Relvini

Integrated Spaceport Automated Data Management Architecture by Ronald Fussell, Donald Ely, Gary Meier, Paul Halpin, Judith Blackwell-Thompson†, Craig Jacobson†, and Phillip Meade†

Method of Making and Using Shape Memory Polymer Composite Patches by Patrick Hood

Method of Making and Using Shape Memory Polymer Patches by Patrick Hood, Sean Garrigan, and Frank Auffinger

Molybdate Conversion Coatings for Aluminum and Aluminum Alloys by Zoran Minevski, Cahit Eylem, Jason Maxey, and Carl Nelson

Monolithic, Glass, Light-Shaping Diffusers by Edgar Mendoza and Robert Lieberman

Software Release Awards

For the public release of a software program
Value: $1,000 (or $500 per inventor)

Analog Input Data Acquisition Software by Ellen Arens†

Application Tools for the Management of Engineering Data on Network Based Storage Resources by Jeffrey May, William Dier, James Eggers, Karl Dahlbeck, Alexander Morgan, and William Nutter

Collaborative Integrated Processing Solutions (CIPS) by Scott Finnie, Charles Hallett, Peter Kent, and Billy Shumate

Drive the Mars Rovers by Donald DiMarzio

Flight Tool Box TRAP (Tool Report Access Program) by Michael Cianciotto, Robert Miller, Richard Craig, and Donald Lisi

Group Capability Model by Michael Olejarski, Stephen Deltorchio, and Amy Appleton

Incremental/Spiral Development Life Cycle Simulation Model for Software Development Projects by Carolyn Mizell†, Charles Curley, and Umanath Nayak

LabVIEW Driver for FLIR Photon Ethernet Module Interface by Christopher Immer

Tech Briefs Awards

For technologies approved for publication in *NASA Tech Briefs*
Value: $350

Dual Cryogenic Capacitive Density Sensor by Robert Youngquist†, Carlos Mata, Robert Cox, and Peter Vokrot

Improved Thermal Reactivity of Hydrogen-Sensing Pigments in Manufactured Polymer Composites by Luke Roberson†, Trent Smith†, Martha Williams†, LaNetra Tate†, and Janine Captain†

Model and Graphic Information Converter (MAGIC) by Wyck Hebert†

Utilization of Desorption Electrospray Ionization (DESI) for the Selective In-Situ Detection of Hydrazine Derivatives by Cristina Berger and Timothy Griffin†. ■

†*Civil servant*

IPP Seed Fund *(continued from page 9)*

or DLR) and PISCES. All the organizations coordinated their efforts to be at the PISCES test site in November 2008, to maximize collaborative opportunities among their respective demonstrations.

Looking ahead, CSA has proposed further field testing, now planned for January 2010, with involvement of NASA, DLR, and JAXA. CSA will begin testing its lunar rover testbeds, and NASA plans to continue testing more advanced and upgraded ISRU hardware. One of NASA's goals is to extract 14 percent oxygen from the soil, a higher amount than achieved in November 2008. Now that researchers know they can extract oxygen from volcanic rock, they intend to improve the process and make it viable in actual lunar conditions. ■

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Kennedy Tech Transfer News is the semiannual magazine of the Innovative Partnerships Program Office at NASA's Kennedy Space Center in Cape Canaveral, Florida. This magazine seeks to inform and educate civil servant and contractor personnel at KSC about actively participating in achieving NASA's technology transfer and partnership goals. Please send suggestions or feedback about *Kennedy Tech Transfer News* to the editor.

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